UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte NAOKATSU IKEGAMI

Appeal No. 2005-1404
Application 09/996,788

ON BRIEF

Before, PAK, DELMENDO, and PAWLIKOWSKI, Administrative Patent Judges.

PAWLIKOWSKI, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 10-15. A copy of claims 10, 12, and 14 is attached to this decision.

Claims 10-15 stand rejected under 35 U.S.C. § 103 as being obvious over Tahara, in view of Yamada and Pu.

The examiner relies on the following references as evidence of unpatentability:

Tahara	5,356,515	Oct. 18, 1984
Yamada	5,827,778	Oct. 27, 1998
Pu et al. (Pu)	5,843,847	Dec. 01, 1998

We note that at the top of page 3 of the answer, the examiner lists U.S. Patent No. 6,174,796. However, this reference is not applied in the instant rejection, and therefore we do not consider it.

In the reply brief, on page 2, appellant argues that the examiner's grouping of the claims is incorrect. That is, appellant argues that claims 10, 12 and 14 are separately patentable. We observe that at the bottom of page 14 and at top of page 15 of the brief, appellant presents arguments with respect to these claims. We therefore consider claims 10, 12 and 14 in this appeal.[1]

We have carefully reviewed the appeal brief and reply brief, the examiner's answer, and the evidence of record. This review has led us to the following determinations.

OPINION

I. The 35 U.S.C. § 103 rejection of claims 10-15 as being obvious over Tahara in view of Yamada and Pu

We refer to the examiner's position as set forth on pages 3-6 of the answer.

Beginning on page 6 of the brief, appellant argues that his claimed process includes use of an etching gas that allows for polymerizing action that deposits a polymeric product on the etched portion. Appellant argues that the etching gas and conditions are intentionally set in the present invention so that the polymeric product is deposited in the etched groove of Fig. 1(c) which is formed due to mask misalignment.

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[1] To the extent that any one claim has been separately argued, we consider such claims in our assessment of the rejection before us. See former regulation 37 CFR § 1.192(c)(7)(2003) and compare current regulation 37 CFR § 41.37(c)(1)(vii)(September 13, 2004). Also see

At the top of page 7 of the brief, appellant emphasizes that the polymeric product is intentionally deposited within the misalignment groove during etching and is used as an etch stop to stop etching of the misalignment groove.

At the bottom of page 7 of the brief, appellant also argues that Tahara discloses a contact hole 87, and that Figure 7B shows that this contact hole 87 is aligned with wiring 85 and that, therefore, the occurrence of misalignment grooves is not described in Tahara.

At the top of page 4 of the answer, the examiner recognizes that Tahara does not specifically indicate misalignment of the etching mask. The examiner relies on Yamada for teaching that the kind of misalignment claimed by appellant is known in the art. The examiner refers to Figures 1B and 1C of Yamada in this regard.

On page 8 of the brief, appellant argues that while Yamada teaches the problem of mask misalignment, Yamada does not disclose that polymeric products are formed during etching for use as an etch stop.

However, as pointed out by the examiner on page 4 of the answer, the examiner relies on Pu for showing that it is known in the art that the use of the etchant gas, CHF_3/CO, forms complex polymeric byproducts, that deposit as passivating layers, that reduce etching. The examiner refers to column 1, lines 64 - column 2, line 4 in this regard.

In view of the above findings made by the examiner, it is apparent, as pointed out by the examiner on page 7 of the answer, that one cannot show nonobviousness by attacking references individually where the rejections are based on a combination of references. In re Merck & Co., Inc., 800 F. 2d 1091, 1097, 231 USPQ 375, 380 (Fed. Cir. 1986).

Ex parte Schier, 21 USPQ2d 1016, 1018 (Bd. Pat. App. & Int. 1991).

Beginning on page 4 of the reply brief, appellant argues that his arguments do not attack the references individually. On page 6 of the reply brief, appellant states that, to the contrary, appellant addresses the references respectively, to highlight why the references taken as a whole, fail to disclose or make obvious the features of claim 10.

However, we agree with the examiner's assessment of appellant's arguments in this regard. We note that obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggesting, or motivation to do so found either in the reference, or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In the instant case, the examiner has clearly established the knowledge generally available to one of ordinary skill in the art by discussing the teachings of Yamada and Pu. One of ordinary skill in the art, charged with the knowledge of Yamada and Pu, would have recognized that the commonly known problem of misalignment grooves can be alleviated (short circuit problems avoided) by utilizing a reactive gas for etching that produces a polymeric product that results in the reduction of etching of sidewalls of etched features (a misalignment groove is an etched feature).

While appellant argues that Tahara does not discuss formation of a misalignment groove, the fact remains that it is common knowledge in the art, as evidenced by Yamada, that in making interconnect patterns overlying a substrate, misalignment grooves can be formed. Pu teaches that the use of the etchant gas, CHF_3/CO, forms complex polymeric byproducts, that deposit as passivating layers, that reduce etching of sidewalls of etched features.

Hence, we agree with the examiner's conclusion of obviousness because one of ordinary skill in the art, charged with the knowledge as taught by Tahara and Pu, would have found it obvious to have used an etchant gas (as in Pu) to reduce etching of sidewalls of an etched feature (a misalignment groove is an etched feature), to alleviate short circuiting caused by such misalignment grooves.

With regard to dependent claims 12 and 14, on pages 14 and 15 of the brief, appellant argues the particular processing parameters of these claims (reaction chamber pressure, offset portion, and flow rate of the reactive gas). We agree with the examiner's position as set forth on pages 5 and 6 of the answer. That is, we agree with the examiner's position that the choice of process parameters such as flow rate of the reactive gas or the reaction chamber pressure or the offset portion would have been obvious based on the specific product design and requirement. See In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." (citations omitted)).

In view of the above, we therefore affirm the 35 U.S.C. § 103 rejection of claims 10-15 as being obvious over Tahara in view of Yamada and Pu.

II. Conclusion

The rejection is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv)(effective September 13, 2004; 69 Fed. Reg. 49960 (August 12, 2004); 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)).

AFFIRMED

CHUNG K. PAK)
Administrative Patent Judge)
)
ROMULO H. DELMENDO)
Administrative Patent Judge) BOARD OF PATENT APPEALS AND INTERFERENCES
)
BEVERLY A. PAWLIKOWSKI)
Administrative Patent Judge)

BAP/vsh

Appeal No. 2005-1404
Application No. 09/996,788

~~VOLENTINE FRANCOS, PLLC~~
~~SUITE 150~~
~~12200 SUNRISE VALLEY DRIVE~~
~~RESTON, VA 20191~~

VOLENTINE, FRANCOS, & WHITT PLLC
ONE FREEDOM SQUARE
11951 FREEDOM DRIVE
SUITE 1260
RESTON, VA 20190

10. A method of forming a conductive path in a semiconductor device, the conductive path to extend from an upper surface of an insulating layer of silicon dioxide formed on a silicon substrate to a conductive member embedded in the insulating layer, the method comprising:

forming an etching mask on the insulating layer, the etching mask having an opening over the conductive member and the opening being misaligned to include an offset portion extending beyond the conductive member

etching a hole in the insulating Layer to the conductive member using the etching mask and a reactive gas, the hole including a misalignment groove in the insulating Layer at a side of the conductive member that corresponds to the offset portion of the opening in the etching mask;

stopping a downward extension of said etching of the misalignment groove by using a polymeric product as an etch stop, the polymeric product generated by a polymeric film generating action of the reactive gas during said etching; and

filling the hole and the misalignment groove with a conductive material to form the conductive path.

12. The method of forming a conductive path of claim 11, wherein said etching is performed in a reaction chamber at a reaction chamber pressure not less than 100mTrorr and a high-frequency power of 1600W, and the offset portion is not more than 0.04/μm.

14. The method of forming a conductive path of claim 11, wherein a flow rate of the reactive gas during said etching is not less than about 300 sccm,

said etching is performed in a reaction chamber at a reaction pressure not less than 200m Torr, and the offset portion is not more than 0.1μm.